



- ☐ Tentative Specification
☐ Preliminary Specification
☒ Approval Specification

MODEL NO.: V315H3
SUFFIX: PE5

Customer: Foxconn for Sony Project
CONFIRMED BY SIGNATURE

Name / Title

APPROVED BY

SIGNATURE

Name / Title

Note

Please return 1 copy for your confirmation with your signature and comments.

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1. GENERAL DESCRIPTION**1.1 OVERVIEW**

V315H3-PE5 is a 31.5" TFT Liquid Crystal Display product with driver ICs and 2ch-LVDS interface. This product supports 1920 x 1080 Full HDTV format and can display 1G colors (10bit/FRC). The backlight unit is not built in.

1.2 FEATURES

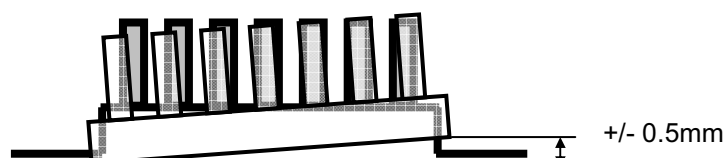
CHARACTERISTICS ITEMS	SPECIFICATIONS
Screen Diagonal [in]	31.5
Pixels [lines]	1920 × 1080
Active Area [mm]	698.4(H) × 392.85(V)
Sub-Pixel Pitch [mm]	0.12125(H) × 0.36375(V)
Pixel Arrangement	RGB vertical stripe
Weight [g]	TYP. 1150g
Physical Size [mm]	727.68(W) × 434.3(H) × 1.8(D) Typ.
Display Mode	Transmissive mode / Normally black
Contrast Ratio	5000:1 Typ. (Typical value measure at CMI's module)
Glass thickness (Array / CF) [mm]	0.7 / 0.7
Viewing Angle (CR>20)	+88/-88(H), +88/-88(V) Typ. (CR≥20) (Typical value measure at CMI's module)
Color Chromaticity	R = (0.644, 0.323) G = (0.252, 0.580) B = (0.134, 0.103) W= (0.281, 0.327) * Please refer to "color chromaticity" on p.18
Cell Transparency [%]	4.05%
Polarizer Surface Treatment	Anti-Glare coating (Haze 11%), Hard coating :(3H) (CF Side),(6B) (TFT Side)
Polarizer Maker & Mark	Sumika

1.3 MECHANICAL SPECIFICATIONS

Item	Min.	Typ.	Max.	Unit	Note
Weight	1100	1150	-	g	-
I/F connector mounting position	The mounting inclination of the connector makes the screen center within $\pm 0.5\text{mm}$ as the horizontal.				(2)

Note (1) Please refer to the attached drawings for more information of front and back outline dimensions.

Note (2) Connector mounting position



2. ABSOLUTE MAXIMUM RATINGS**2.1 ABSOLUTE RATINGS OF ENVIRONMENT**

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Storage Temperature	TST	-20	+60	°C	(1) With CMI Module
Operating Ambient Temperature	TOP	0	50	°C	(1), (2) With CMI Module

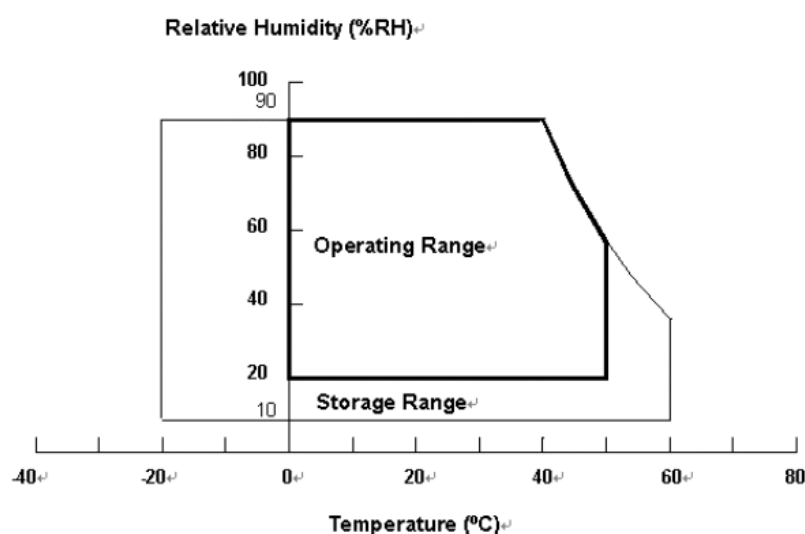
Note (1) Temperature and relative humidity range is shown in the figure below.

(a) 90 %RH Max. ($T_a \leq 40\text{ }^{\circ}\text{C}$).

(b) Wet-bulb temperature should be 39 °C Max. ($T_a > 40\text{ }^{\circ}\text{C}$).

(c) No condensation.

Note (2) The maximum operating temperature is based on the test condition that the surface temperature of display area is less than or equal to 65 °C with LCD module alone in a temperature controlled chamber. Thermal management should be considered in final product design to prevent the surface temperature of display area from being over 65 °C. The range of operating temperature may degrade in case of improper thermal management in final product design.

**2.2 ABSOLUTE RATINGS OF ENVIRONMENT (OPEN CELL)**

Recommended Storage Condition: With shipping package.

Recommended Storage temperature range: 25±5 °C

Recommended Storage humidity range: 50±10%RH

Recommended Shelf life: a month

**2.3 ELECTRICAL ABSOLUTE RATINGS****2.3.1 TFT OPEN CELL**

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Voltage for gate driver	VGH	-0.3	40	V	
Voltage for gate driver	VGL	-20	0.3	V	
Voltage range for gate driver	VGH - VGL	-0.3	45	V	
Voltage for data diver	VAA	12	18	V	
Logic Input Voltage	VIN	-0.3	5	V	

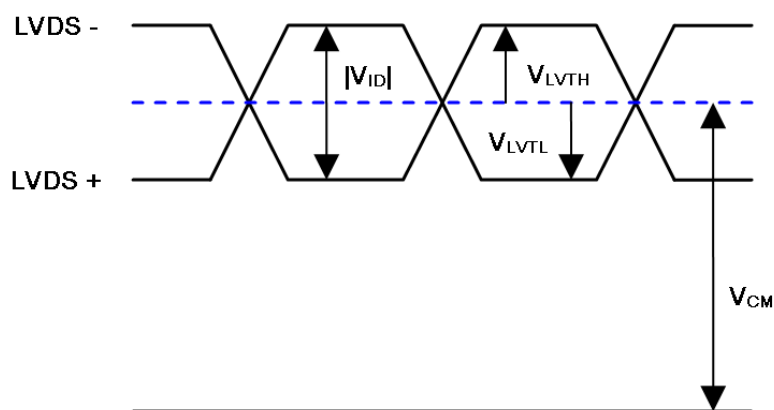
3. ELECTRICAL CHARACTERISTICS

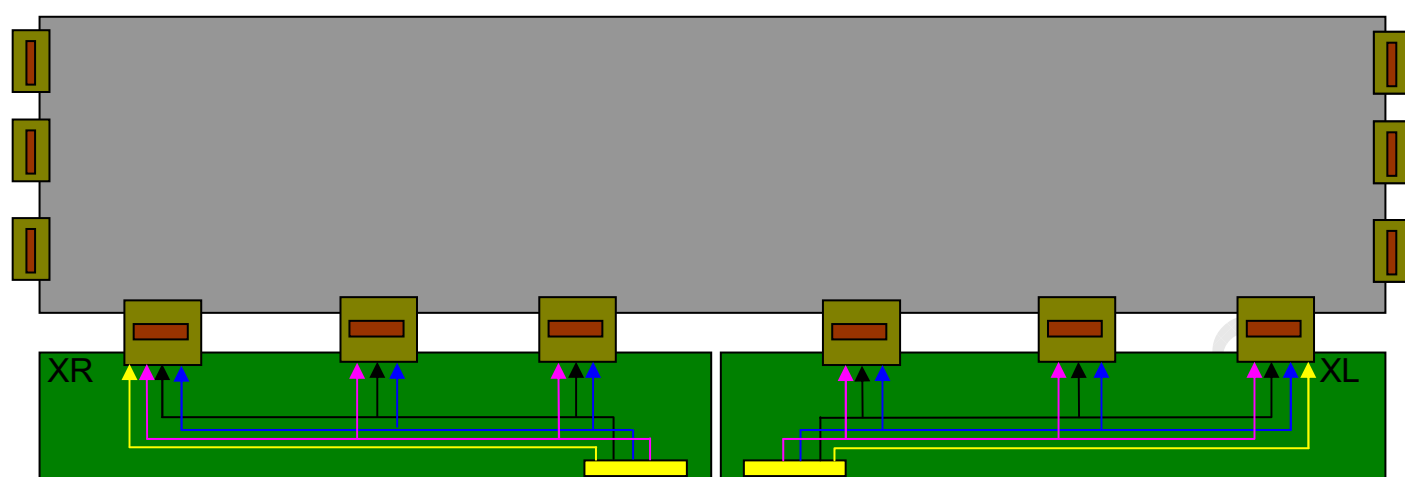
3.1 TFT OPEN CELL

(Ta = 25 ± 2 °C)

Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Voltage for gate driver		VGH	29	30	31	V	
Voltage for gate driver		VGL	-5.8	-5.5	-5.2	V	
Voltage range for gate driver		VGH - VGL	34.2	35.5	36.8	V	
Voltage for data driver		VAA	17.4	17.7	18	V	
Voltage for data driver		VAAM	7.5	7.8	8.1	V	
Mini- LVDS interface	Differential Input High Threshold Voltage	V _{LVTH}	+100	—	—	mV	(1)
	Differential Input Low Threshold Voltage	V _{LVTL}	—	—	-100	mV	
	Common Input Voltage	V _{CM}	1.0	1.2	1.4	V	
	Differential input voltage	V _{ID}	200	—	600	mV	
	Terminating Resistor	R _T	—	100	—	ohm	
CMOS interface	Input High Threshold Voltage	V _{IH}	2.7	—	3.3	V	
	Input Low Threshold Voltage	V _{IL}	0	—	0.7	V	

Note (1) The Mini- LVDS input characteristics are as follows:



3.2 CIRCUIT AND WIRING DIAGRAM OF SPWB

Mini-LVDS signal: 2path-6pair.

Control signals of data drivers.

Voltages of data drivers.

Control signals and voltages of scan drivers.

3.3 SPWB INFORMATION

	Parts Name	M't Vender	Manufacturer	Type	Flame	Class	UL File
Source Board	Wiring, PCB for Source board (XL)	USI (Universal Scientific Industrial Corp.) TSMT (Alternative) (Taiwan Surface Mounting technology Corp.)	Dynamic	M0-V0 KM-V0	94V-0		E150630(TW) E255400((KunShan)
			Tripod (Alternative)	2-9	94V-0		E222034
			TPT (Alternative)	MV-0 MV-QS	94V-0		E88441
Source Board	Wiring, PCB for Source board (XR)	USI (Universal Scientific Industrial Corp.) TSMT (Alternative) (Taiwan Surface Mounting technology Corp.)	Dynamic	M0-V0 KM-V0	94V-0		E150630(TW) E255400((KunShan)
			Tripod (Alternative)	2-9	94V-0		E222034
			TPT (Alternative)	MV-0 MV-QS	94V-0		E88441
T-con Board	Wiring, PCB for TFT control board	USI (Universal Scientific Industrial Corp.) TSMT (Alternative) (Taiwan Surface Mounting technology Corp.)	Dynamic	M0-V0 KM-V0	94V-0		E150630(TW) E255400((KunShan)
			Tripod (Alternative)	2-9	94V-0		E222034
			TPT (Alternative)	MV-0 MV-QS	94V-0		E88441

	Parts Name	Manufacturer	Type	Flame	Class	UL File
FPC	Source COF(NT39810EH-C5225A)	Toray-Dupont	150EN	94V-0		E73117
	Gate COF(NT39540H-C5224A)	Toray-Dupont	150EN	94V-0		E73117

**4. INPUT TERMINAL PIN ASSIGNMENT****4.1 TFT LCD OPEN CELL INPUT****CN1 (XL) Connector Pin Assignment :**

Pin	Name	Description	Note
1	GND	Ground	
2	MLA6N	Mini-LVDS data signal-	
3	MLA6P	Mini-LVDS data signal+	
4	MLA5N	Mini-LVDS data signal-	
5	MLA5P	Mini-LVDS data signal+	
6	MLA4N	Mini-LVDS data signal-	
7	MLA4P	Mini-LVDS data signal+	
8	GND	Ground	
9	MLACKN	Mini-LVDS clock signal-	
10	MLACKP	Mini-LVDS clock signal+	
11	GND	Ground	
12	MLA2N	Mini-LVDS data signal-	
13	MLA2P	Mini-LVDS data signal+	
14	MLA1N	Mini-LVDS data signal-	
15	MLA1P	Mini-LVDS data signal+	
16	MLA0N	Mini-LVDS data signal-	
17	MLA0P	Mini-LVDS data signal+	
18	GND	Ground	
19	OE1	Scan driver output enable	
20	OE2	Scan driver output enable	
21	CKV	Scan driver clock	
22	POL2	Data driver polarity invert	
23	POL	Data driver polarity invert	
24	CSTV	Scan driver start pulse	
25	TP1	Data driver data latch	
26	VDASEL	Half VAA selection	(1)
27	PAIRMODE	Data bus mode selection	(2)
28	GND	Ground	
29	GND	Ground	
30	GM18	Gamma voltage	
31	GM17	Gamma voltage	
32	GM16	Gamma voltage	
33	GM13	Gamma voltage	
34	GM12	Gamma voltage	
35	GM10	Gamma voltage	
36	GM9	Gamma voltage	
37	GM7	Gamma voltage	
38	GM6	Gamma voltage	
39	GM3	Gamma voltage	
40	GM2	Gamma voltage	
41	GM1	Gamma voltage	
42	GND	Ground	
43	VDDAH	Half VAA voltage	
44	VDDAL	Half VAA voltage	
45	GND	Ground	
46	VCM	VCOM voltage	
47	VCM	VCOM voltage	
48	GND	Ground	
49	VDDA	VAA voltage	
50	VDDA	VAA voltage	

51	GND	Ground	
52	VDD	Logic power	
53	VDD	Logic power	
54	GND	Ground	
55	VGL	Scan driver voltage	
56	VGL	Scan driver voltage	
57	GND	Ground	
58	VGH	Scan driver voltage	
59	VGH	Scan driver voltage	
60	GND	Ground	

CN1 (XR) Connector Pin Assignment :

Pin	Name	Description	Note
1	GND	Ground	
2	VGH	Scan driver voltage	
3	VGH	Scan driver voltage	
4	GND	Ground	
5	VGL	Scan driver voltage	
6	VGL	Scan driver voltage	
7	GND	Ground	
8	VDD	Logic power	
9	VDD	Logic power	
10	GND	Ground	
11	VDDA	VAA voltage	
12	VDDA	VAA voltage	
13	GND	Ground	
14	VCM	VCOM voltage	
15	VCM	VCOM voltage	
16	GND	Ground	
17	VDDAL	Half VAA voltage	
18	VDDAH	Half VAA voltage	
19	GND	Ground	
20	PAIRMODE	Data bus mode selection	(2)
21	VDASEL	Half VAA selection	(1)
22	TP1	Data driver data latch	
23	CSTV	Scan driver start pulse	
24	POL	Data driver polarity invert	
25	POL2	Data driver polarity invert	
26	CKV	Scan driver clock	
27	OE2	Scan driver output enable	
28	OE1	Scan driver output enable	
29	GND	Ground	
30	GND	Ground	
31	MLB6N	Mini-LVDS data signal-	
32	MLB6P	Mini-LVDS data signal+	
33	MLB5N	Mini-LVDS data signal-	
34	MLB5P	Mini-LVDS data signal+	
35	MLB4N	Mini-LVDS data signal-	
36	MLB4P	Mini-LVDS data signal+	
37	GND	Ground	
38	MLBCKN	Mini-LVDS clock signal-	
39	MLBCKP	Mini-LVDS clock signal+	
40	GND	Ground	

41	MLB2N	Mini-LVDS data signal-	
42	MLB2P	Mini-LVDS data signal+	
43	MLB1N	Mini-LVDS data signal-	
44	MLB1P	Mini-LVDS data signal+	
45	MLB0N	Mini-LVDS data signal-	
46	MLB0P	Mini-LVDS data signal+	
47	GND	Ground	
48	GM18	Gamma voltage	
49	GM17	Gamma voltage	
50	GM16	Gamma voltage	
51	GM13	Gamma voltage	
52	GM12	Gamma voltage	
53	GM10	Gamma voltage	
54	GM9	Gamma voltage	
55	GM7	Gamma voltage	
56	GM6	Gamma voltage	
57	GM3	Gamma voltage	
58	GM2	Gamma voltage	
59	GM1	Gamma voltage	
60	GND	Ground	

Note (1) VDA select: Half/Full VAA operating range selection.

Low = Connect to GND, High = Connect to +3.3V

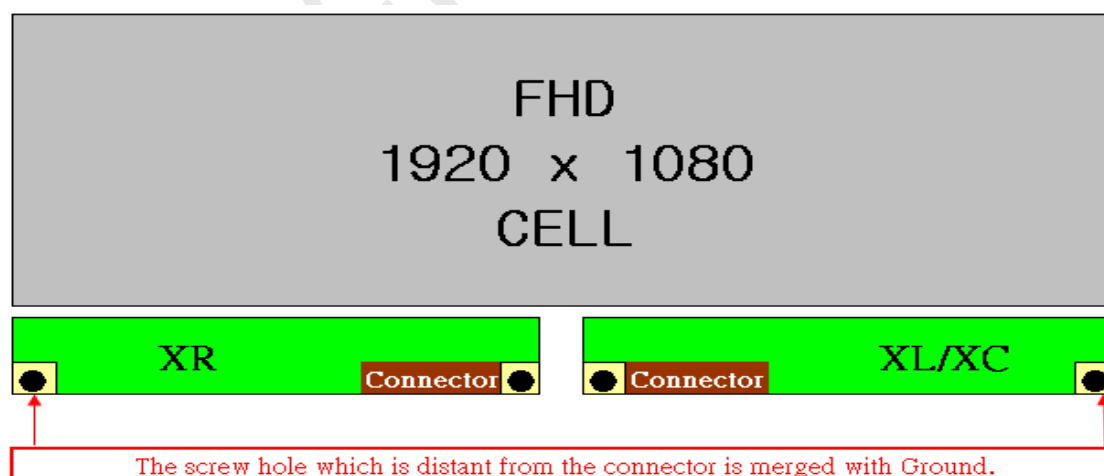
VDA SEL	Note
L	Full VAA
H	Half VAA (V315H3-PE5 setting)

Note (2) Pairmode: Data bus mode selection.

Low = Connect to GND, High = Connect to +3.3V

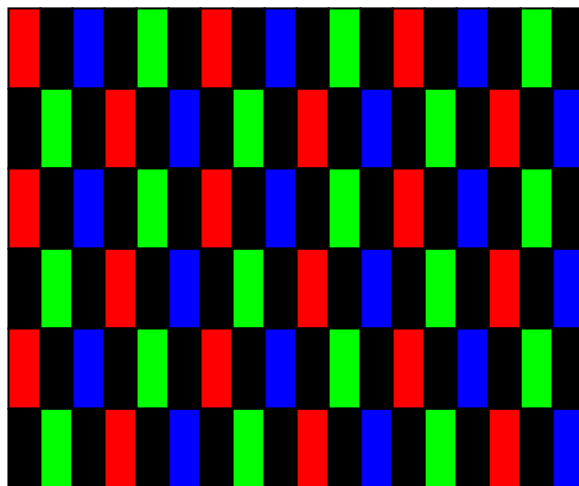
PAIRMODE	Note
L	3 pair
H	6 pair (V315H3-PE5 setting)

Note (3) The screw hole which is distant from the connector is merged with Ground



4.2 FLICKER (Vcom) ADJUSTMENT**(1) Adjustment Pattern:**

Sub-pixel on-off pattern was shown as below. If customer need below pattern, please directly contact with Account FAE.

**(2) Adjustment method: (Digital V-com)**

Programmable memory IC is used for Digital V-com adjustment in this model. CMI provide Auto Vcom tools to adjust Digital V-com. The detail connection and setting instruction, please directly contact with Account FAE or refer CMI Auto V-com adjustment OI. Below items is suggested to be ready before Digital V-com adjustment in customer LCM line.

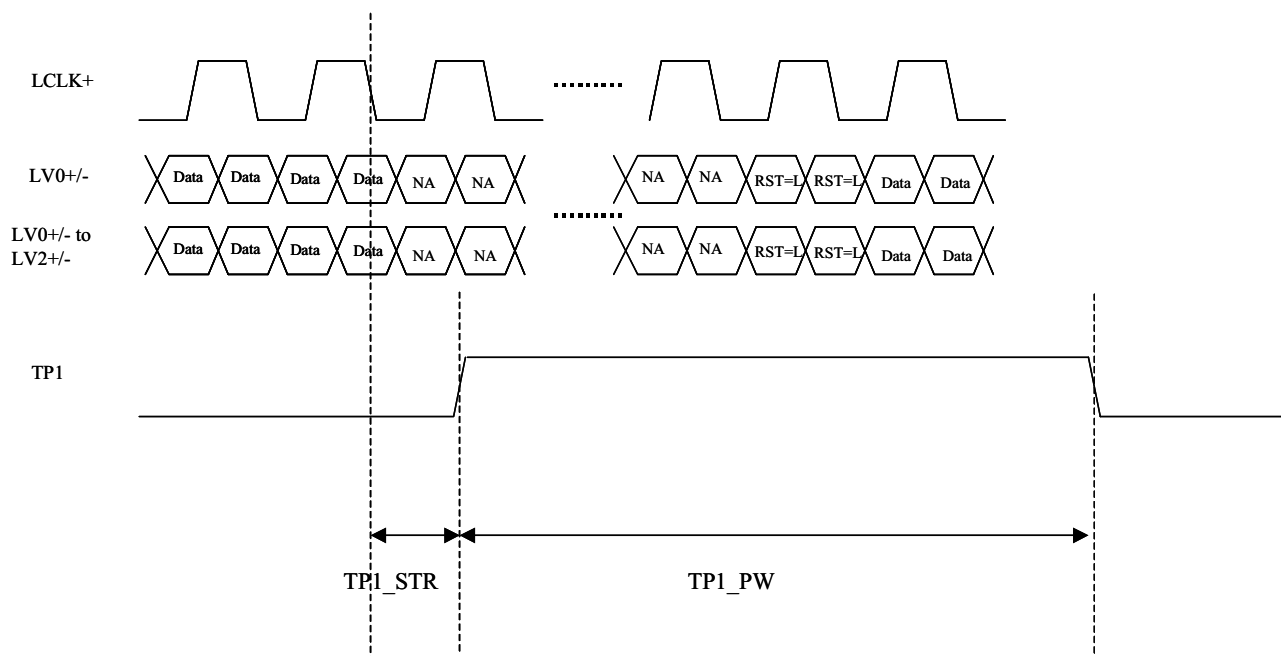
- a. USB Sensor Board.
- b. Programmable software.

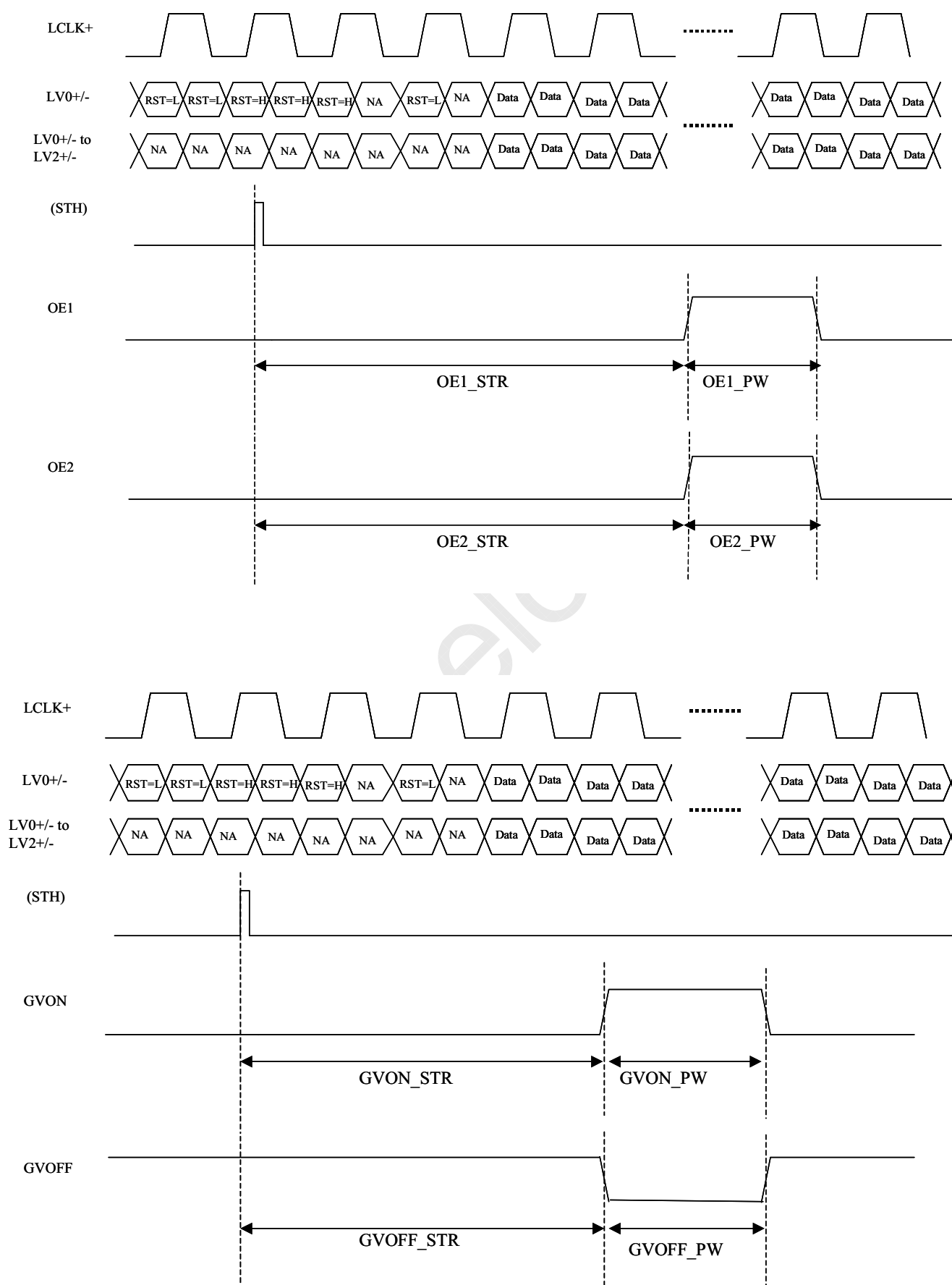
5. INTERFACE TIMING**5.1 INPUT SIGNAL TIMING SPECIFICATIONS**

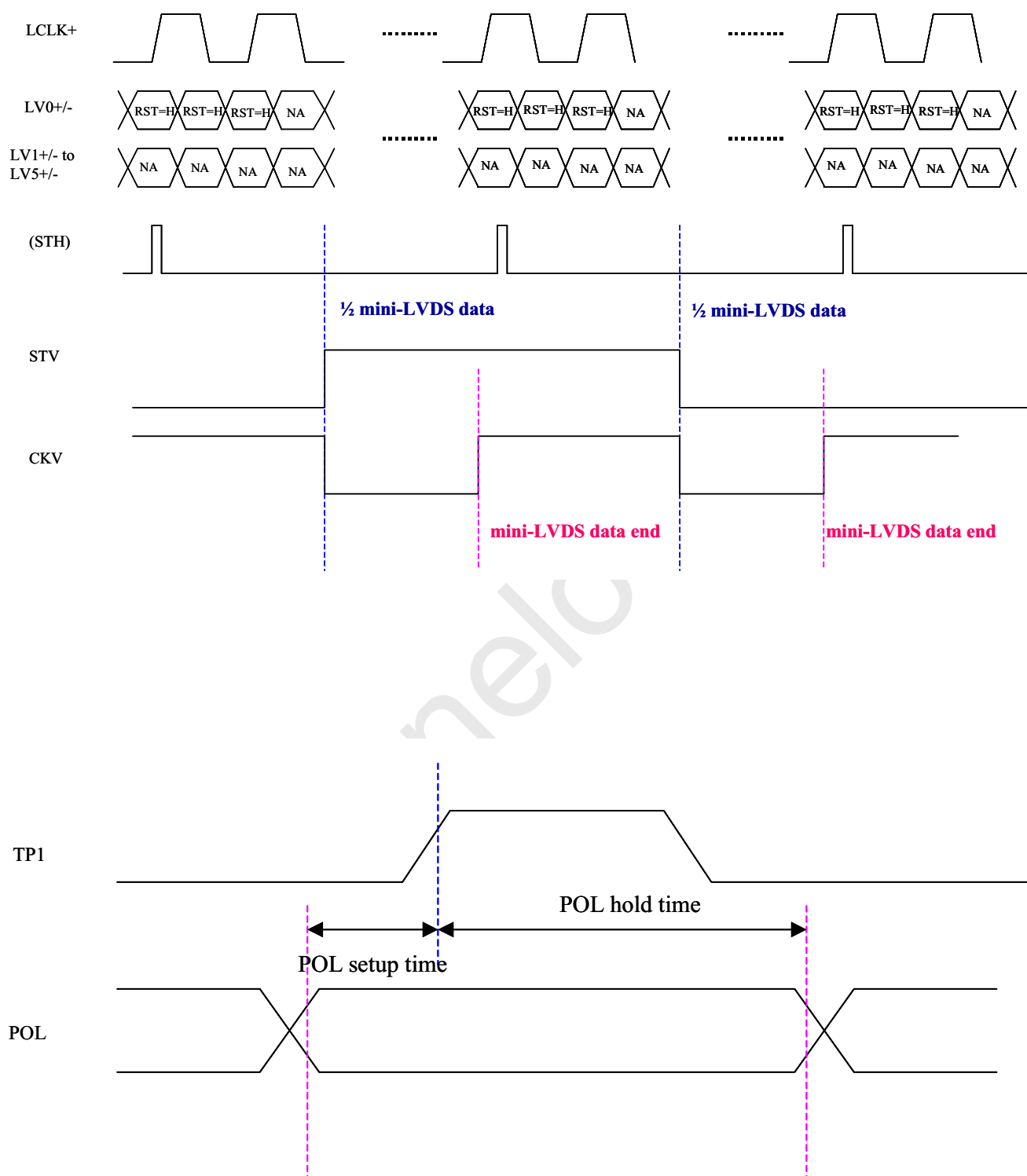
(Ta = 25 ± 2 °C)

The input signal timing specifications are shown as the following table and timing diagram.

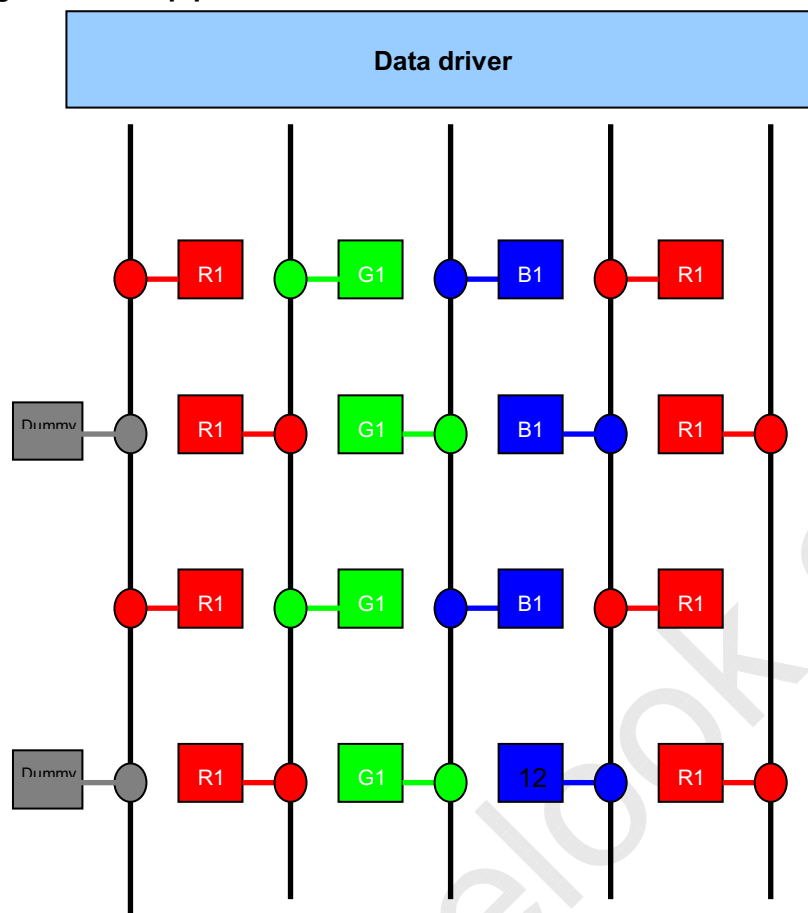
Signal	Item	Symbol	Typ	Unit
TP1	TP1 start	TP1_STR	194	CLK
	TP1 pulse width	TP1_PW	13	CLK
OE	OE1 start	OE1_STR	137	CLK
	OE pulse width	OE1_PW	44	CLK
	OE2 start	OE2_STR	137	CLK
	OE2_PW	OE2_PW	44	CLK
STV	Scan driver start pulse width	STV	37	CLK
CKV	Scan driver clock	CKV	130	CLK
POL	Data driver polarity invert	POL	123	CLK
Data arrangement			Flip pixel -2	







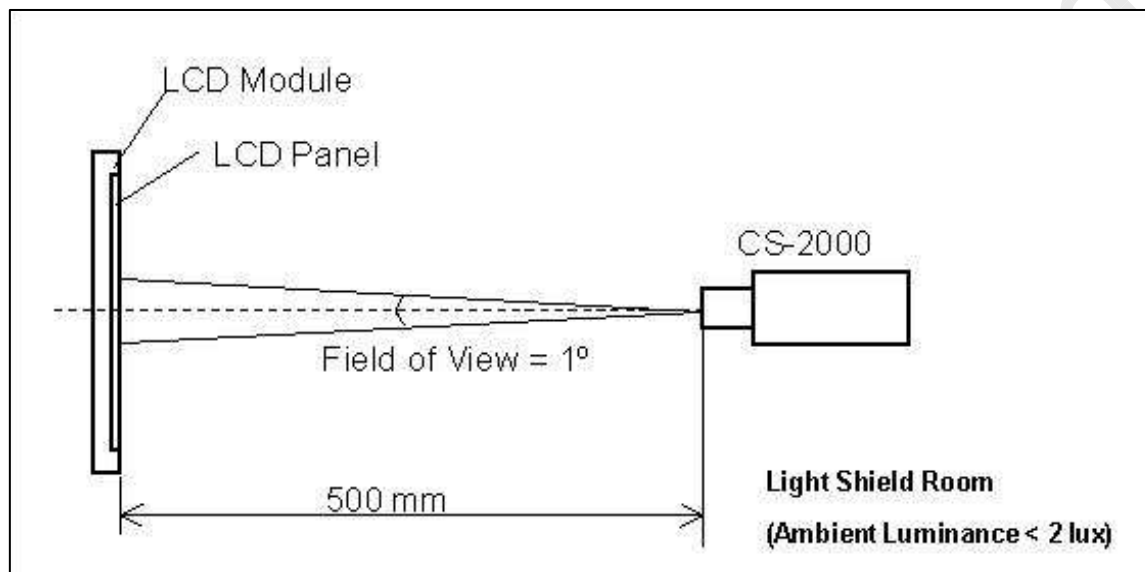
Data arrangement of Flip pixel -2



6. OPTICAL CHARACTERISTICS**6.1 TEST CONDITIONS**

Item	Symbol	Value	Unit
Ambient Temperature	Ta	25±2	°C
Ambient Humidity	Ha	50±10	%RH
Vertical Frame Rate	Fr	120	Hz

Note (1) The LCD module should be stabilized at given temperature for 1 hour to avoid abrupt temperature change during measuring in a windless room.



Note (2) The LCD module should be measured with CMI T-CON code and follow the T-CON spec.

6.2 OPTICAL SPECIFICATIONS

The relative measurement methods of optical characteristics are shown as below. The following items should be measured under the test conditions described in 7.1 and stable environment shown in 7.1.

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Color Chromaticity	Red	Rcx	$\theta_x=0^\circ, \theta_Y=0^\circ$ Viewing Angle at Normal Direction Standard light source “C”	Typ.-0.03	0.644	Typ+0.03	-	(0)
		Rcy			0.323		-	
	Green	Gcx			0.252		-	
		Gcy			0.580		-	
	Blue	Bcx			0.134		-	
		Bcy			0.103		-	
	White	Wcx			0.281		-	
		Wcy			0.327		-	
	Center Transmittance				T%		$\theta_x=0^\circ, \theta_Y=0^\circ$ with CMI module	
Contrast Ratio		CR	3500	5000	-	-		(1),(3)
Response Time (VA)		T _{Rr}	$\theta_x=0^\circ, \theta_Y=0^\circ$ with CMI Module@120Hz Panel Temperature 34℃	-	30	-	ms	(1),(4)
		T _F		-	4	-	ms	
		Gray to Gray		-	6.5	13	ms	
Viewing Angle	Horizontal	θ_x+	CR _≥ 20 (VA) with CMI module	80	88	-	Deg.	(1),(2)
		θ_x-		80	88	-		
	Vertical	θ_Y+		80	88	-		
		θ_Y-		80	88	-		

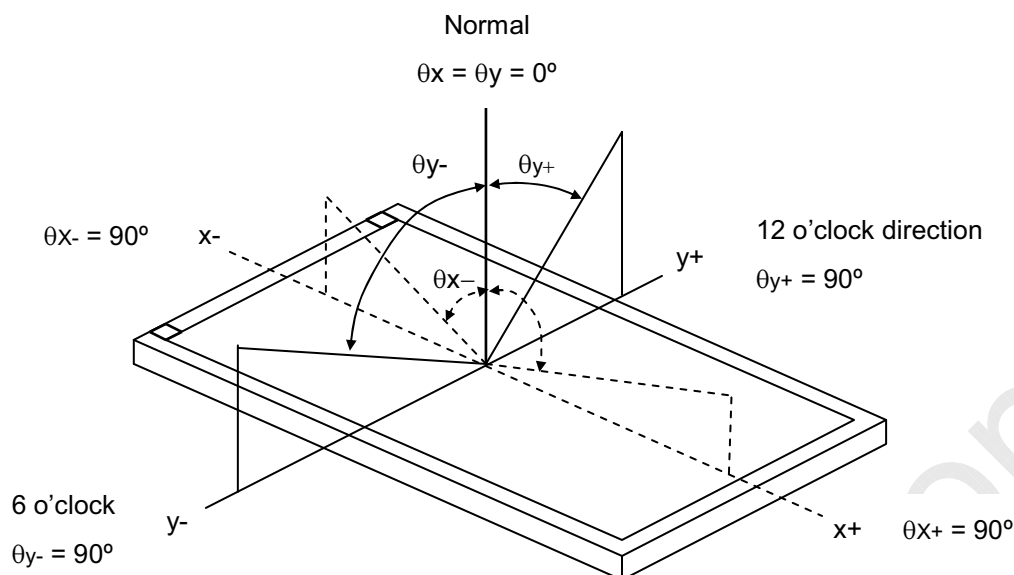
Note (0) Light source is the standard light source "C" which is defined by CIE and driving voltage are based on suitable gamma voltages. The calculating method is as following:

1. Measure Module's W,R,G,B spectrum and BLU's spectrum. Which BLU (for V315H3-L01) is supplied by CMI.
2. Calculate cell's spectrum.
3. Calculate cell's chromaticity by using the spectrum of standard light source "C".

Note (1) Light source is the BLU which supplied by CMI and driving voltage are based on suitable gamma voltages.

Note (2) Definition of Viewing Angle (θ_x, θ_y):

Viewing angles are measured by Autronic Conoscope Cono-80 (or Eldim EZ-Contrast 160R)



Note (3) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

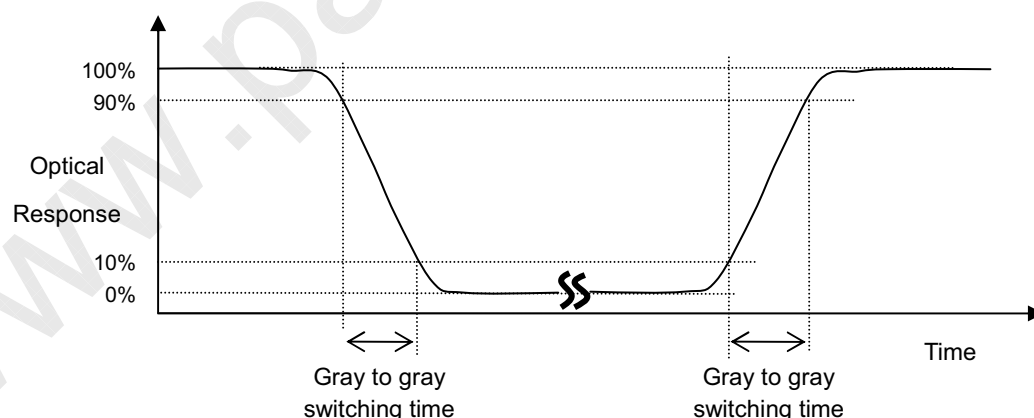
$$\text{Contrast Ratio (CR)} = \frac{\text{Surface Luminance of L255}}{\text{Surface Luminance of L0}}$$

L255: Luminance of gray level 255

L0: Luminance of gray level 0

CR = CR (X), where CR (X) is corresponding to the Contrast Ratio of the point X at the figure in Note (6).

Note (4) Definition of Response time (T_r , T_f , Gray-to-Gray) Switching Time:



The driving signal means the signal of Gray 0, 31, 63, 95, 127, 159, 191, 223, 255.

T_R means switching time from gray 0 to 255, T_F means switching time from gray 255 to 0

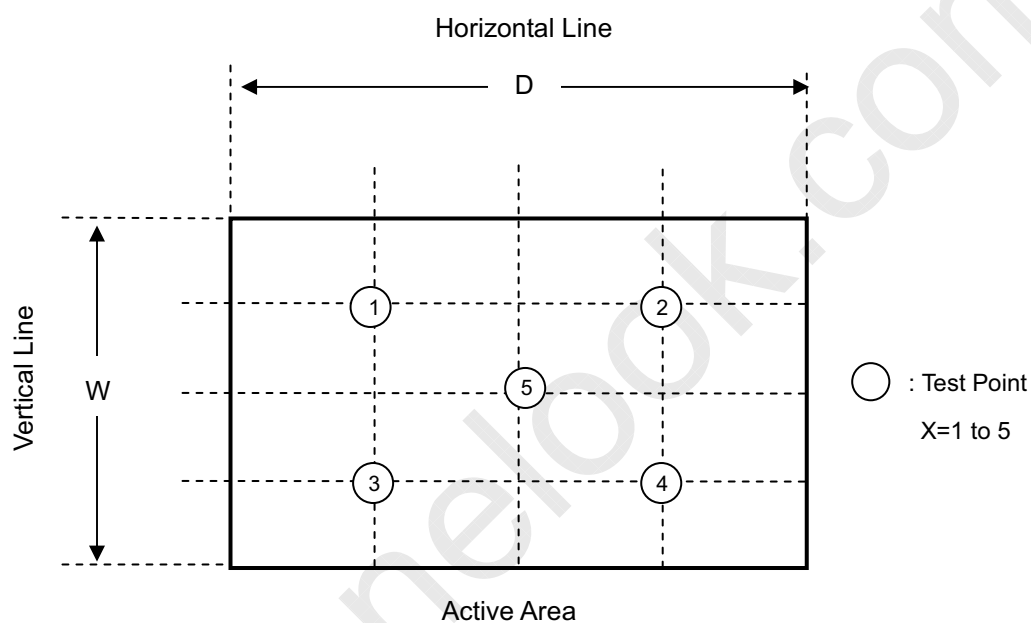
Gray to gray average time means the average switching time of Gray 0, 31, 63, 95, 127, 159, 191, 223, 255. to each other.

Note (5) Definition of Transmittance (T%) :

Measure the luminance of gray level 255 at center point of LCD module.

$$\text{Transmittance (T\%)} = \frac{\text{Luminance of LCD module}}{\text{Luminance of backligh unit}} \times 100\% \text{ PRECAUTIONS}$$

Note (6) Definition of measure position



**7. RELIABILITY TEST CONDITION**

NO.	Test Item	Test Condition
1	HT Operation	Ta=50℃, 1000hrs
2	HT Storage	Ta=60℃, 500hrs
3	LT Operation	Ta=0℃, 500hrs
4	LT Storage	Ta=-20℃, 500hrs
5	HTHH Operation	Ta=50℃/ 80%RH, 500hrs
6	HTHH Storage	Ta=50℃/ 90%RH, 500hrs
7	Thermal Shock (Non-operation)	[(-20℃ 30min)→(60℃ 30min)]/cycle, 200cycles
8	Image Sticking	Ta=50℃, 300hrs
9	ESD-Air mode Discharge	150pf , 330Ω, ±15KV (operation) Class C (With CMI Module)
10	ESD-Contact Mode Discharge	150pf , 330Ω, ±8KV (operation) Class B (With CMI Module)
11	Packing Vibration	1.14Grms Random frequency 1~200Hz 30min/Bottom, 15min/Right-Left, 15min/Front-Back
12	Packing Drop	Bottom 31cm+ 4 edges with 15 angle

8. PRECAUTIONS**8.1 ASSEMBLY AND HANDLING PRECAUTIONS**

- [1] Do not apply rough force such as bending or twisting to the module during assembly.
- [2] It is recommended to assemble or to install a module into the user's system in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.
- [3] Do not apply pressure or impulse to the module to prevent the damage of LCD panel and Backlight.
- [4] Always follow the correct power-on sequence when the LCD module is turned on. This can prevent the damage and latch-up of the CMOS LSI chips.
- [5] The distance between COF edge and rib of BLU must bigger than 5mm. This can prevent the damage of COF when assemble the module.
- [6] Do not design sharp-pointed structure / parting line / tooling gate on the COF position of plastic parts, because the burr will scrape the COF.
- [7] If COF would bended to assemble in the module. Do not put the IC location on the bending corner of COF.
- [8] The gap between COF IC and any structure of BLU must bigger than 2mm. This can prevent the damage of COF IC
- [9] Bezel opening must have no burr. Burr will scrape the panel surface.
- [10] Bezel of module and bezel of set can not press or touch the panel surface. It will make light leakage or scrape.
- [11] When module used FFC / FPC, but no FFC / FPC to be attached in the open cell. Customer can refer the FFC / FPC drawing and buy it by self.
- [12] The gap between Panel and any structure of Bezel must bigger than 2mm. This can prevent the damage of Panel.
- [13] Do not plug in or pull out the I/F connector while the module is in operation.
- [14] Use a soft dry cloth without chemicals for cleaning, because the surface of polarizer is very soft and easily scratched.
- [15] Moisture can easily penetrate into LCD module and may cause the damage during operation.
- [16] When storing modules as spares for a long time, the following precaution is necessary.
 - [16.1] Do not leave the module in high temperature, and high humidity for a long time. It is highly recommended to store the module with temperature from 0 to 35°C at normal humidity without condensation.
 - [16.2] The module shall be stored in dark place. Do not store the TFT-LCD module in direct sunlight or fluorescent light.
- [17] When ambient temperature is lower than 10°C, the display quality might be reduced.
- [18] The peeling strength of COF is 200gf/cm.
- [19] During module assembly process, the static electricity around the environment should be less than 300V.

8.2 SAFETY PRECAUTIONS

- [1] If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.
- [2] After end of life of the open cell product, it is not harmful in case of normal operation and storage.

9. DEFINITION OF LABELS

9.1 OPEN CELL LABEL

The barcode nameplate is pasted on each open cell as illustration for CMI internal control.

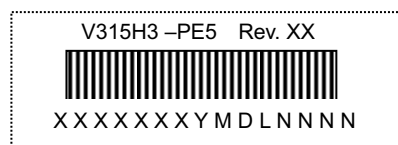
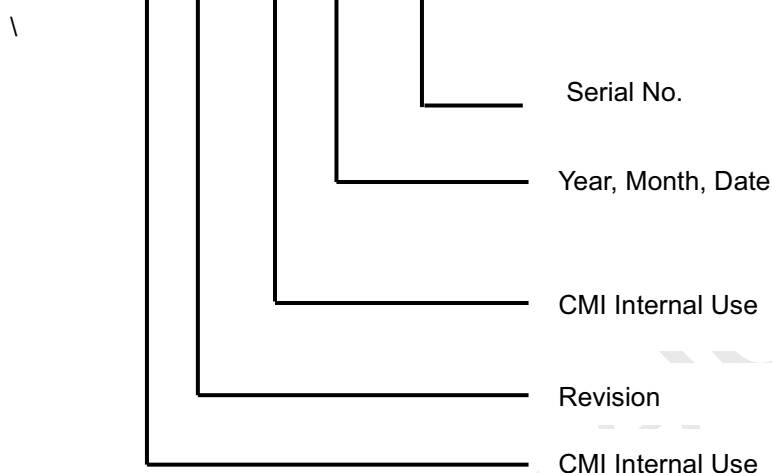


Figure.9-1 Serial No. Label on SPWB and Cell

Model Name: V315H3-PE5

Revision: Rev. XX, for example: A0, A1... B1, B2... or C1, C2...etc.

Serial ID: X X X X X X Y M D L N N N N



Serial ID includes the information as below:

Manufactured Date:

Year: 2010=0, 2011=1, 2012=2...etc.

Month: 1~9, A~C, for Jan. ~ Dec.

Day: 1~9, A~Y, for 1st to 31st, exclude I, O, and U.

Revision Code: Cover all the change

Serial No.: Manufacturing sequence of product

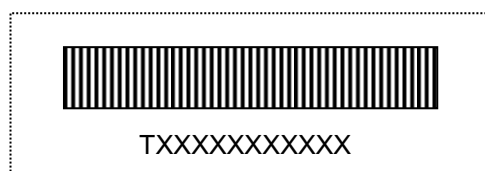
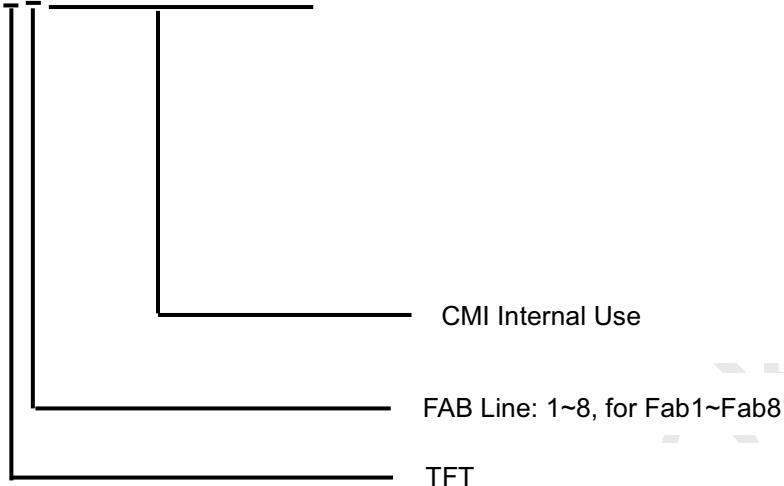


Figure.9-2 Panel ID Label on Cell

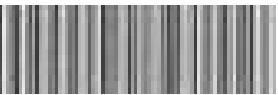
Panel ID Label includes the information as below:

Panel ID: T X X X X X X X X X



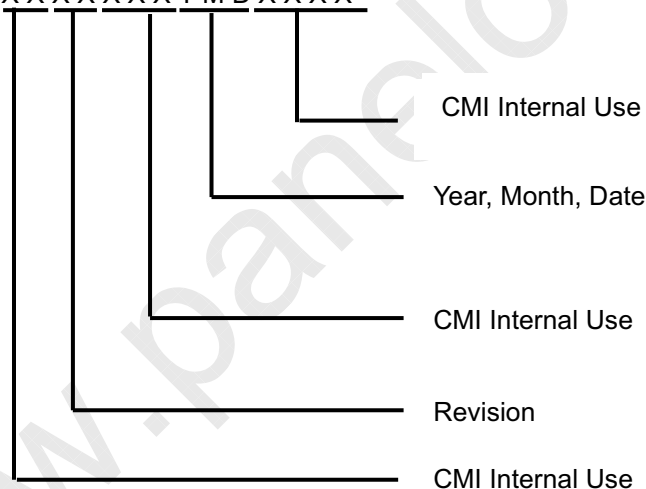
9.2 CARTON LABEL

The barcode nameplate is pasted on each box as illustration, and its definitions are as following explanation.

RoHS	
P.O. NO.	_____
Parts ID.	_____
Model Name	V315H3-PE5
Carton ID.	 XXXXXXXXXXXXXXXX
Quantities	____
Made In Taiwan (Made In China)	

(a) Model Name: V315H3- PE5

(b) Carton ID: X X X X X X Y M D X X X X



Serial ID includes the information as below:

Manufactured Date:

Year: 2010=0, 2011=1, 2012=2...etc.

Month: 1~9, A~C, for Jan. ~ Dec.

Day: 1~9, A~Y, for 1st to 31st, exclude I ,O, and U.

Revision Code: Cover all the change

(c) Quantities: 18

10. PACKAGING

10.1 PACKAGING SPECIFICATIONS

- (1) 18 LCD TV Panels / 1 Box
- (2) Box dimensions : 970 (L) X 640 (W) X 319 (H)
- (3) Weight : approximately 36Kg (18 panels per box)
- (4) Desiccant (Drier) : Weight 30g / 1 piece, Quantity 4 pcs/box, Cobalt chloride free.

10.2 PACKAGING METHOD

Figures 10-1 and 10-2 are the packing method

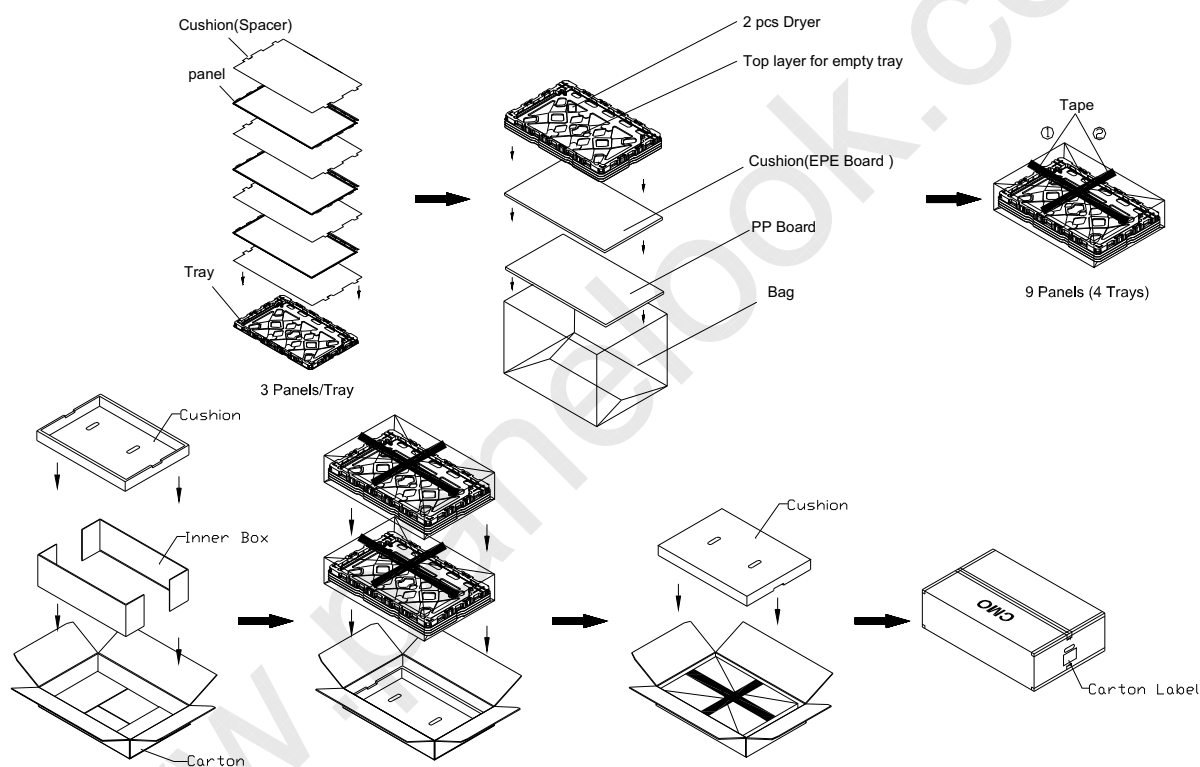
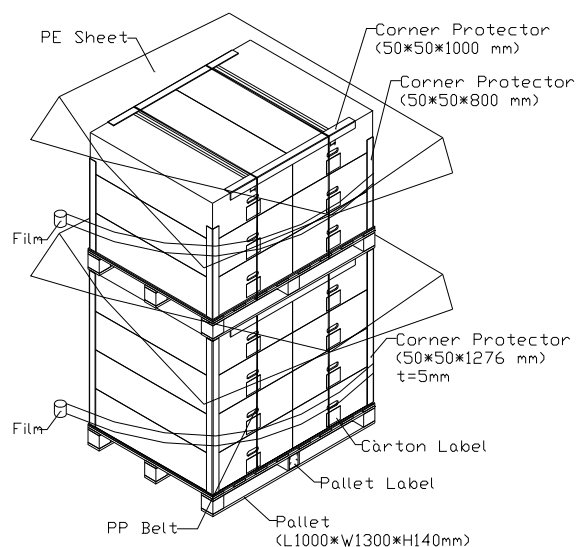
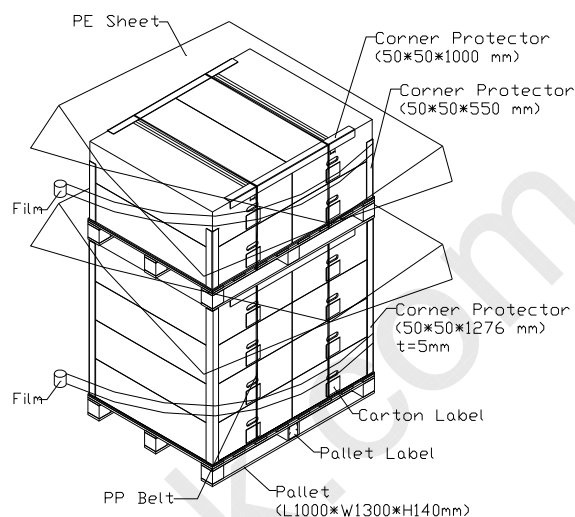


Figure.10-1 packing method

Sea / Land Transportation
(40ft HQ Container)



Sea / Land Transportation
(40ft Container)



Air Transportation

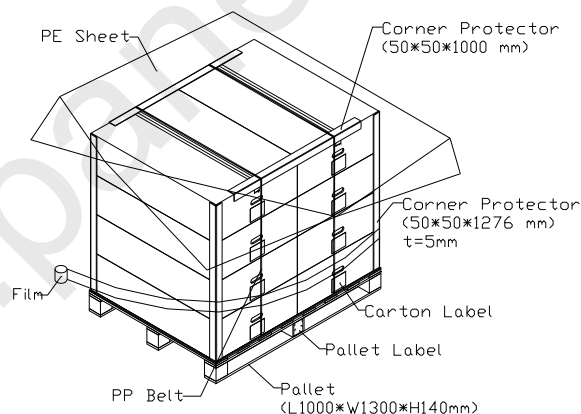


Figure.10-2 packing method

11. MECHANICAL CHARACTERISTIC

